CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/W.No.02/KRIDL/CSR-03/780a/QB(BM)/2014-15 20.03.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
*AGENCY	:	**Technical Manager,** KRIDL, Bangalore.
*NAME OF THE WORK	:	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
REFERENCE	:	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	18.03.2015
DATE OF TESTING	:	20.03.2015

The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	82	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	45	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	302	Min. 220

*Information is furnished by the Customer/Representative.

Note:

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⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

****

VISHWANATH. I.A.
Chief Executive Officer

AEE. @ AEE

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Job No: CTCE/BBMP/W.No.02/KRIDL/BM/AIV/2014-15 20.03.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Source / Location	Hotmix Plant, Bangalore
Type of Mix	Bituminous Macadam
Date of Testing	20.03.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	380	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	79	80	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	300	
4	Aggregate Impact value = percent fines	20.84	21.05	
	$100^* (W_2/W_1)\%$			20.95

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Macadam is 30%

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Job No: CTCE/BBMP/W.No.02/KRIDL/BM/Shape.T/2014-15 : 20.03.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	: AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Technical Reference	: IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	: Bituminious Macadum
Date of Testing	: 20.03.2015

Civil-Tech Consultants & Engineers Bangalore

Flakiness Index = **11.23%**

Elongation Index = **13.10%**

Result : Combined Flakiness & Elongation index **24.33%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Macadam is 30%

Note:

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Job No: CTCE/BBMP/W.No.02/KRIDL/BM/Sp_Wa/2014-15

23.03.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Source / Location	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	23.03.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 2	
1	Weight of aggregate suspended in water with the basket	W_1 g	1999	2000	2001	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_3$ g	1249	1250	1251	
4	Weight of saturated surface dry aggregate in air	W_3 g	2030	2031	2032	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	781	781	781	
6	Weight of oven dried aggregate	W_4 g	2016	2017	2017	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.581	2.583	2.583	2.582
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.628	2.630	2.633	2.631
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.69%	0.69%	0.74%	0.72%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Macadam is 2.0%

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Job No: CTCE/BBMP/W.No.02/KRIDL/CSR-03/780a/SDBC(QB)/2014-15 20.03.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
*AGENCY	:	**Technical Manager,** KRIDL, Bangalore.
*NAME OF THE WORK	:	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
REFERENCE	:	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	18.03.2015
DATE OF TESTING	:	20.03.2015

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	82	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	298	Min. 220

*Information is furnished by the Customer/Representative.

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Job No.: CTCE/BBMP/W.No.02/KRIDL/SDBC/Shape_T/2014-15 20.03.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	20.03.2015

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.95%**

Elongation Index = **13.65%**

Result : Combined Flakiness & Elongation index **25.60%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.02/KRIDL/SDBC/Stripping/2014-15

23.03.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	23.03.2015

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.02/KRIDL/SDBC/Sp_Wa/2014-15 23.03.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	23.03.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2023	2024	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_6$ g	1272	1273	1274	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2016	2017	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_5)$ g	743	743	743	
6	Weight of oven dried aggregate	W_4 g	2000	2004	2003	
7	Specific Gravity	$W_4/(W_3-W_5)$	2.692	2.697	2.696	2.695
8	Apparent Specific gravity	$W_4/(W_4-W_5)$	2.747	2.741	2.748	2.745
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.75%	0.60%	0.70%	0.68%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.02/KRIDL/CSR-03/780a/CUBE/2014-15 13.04.2015

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

* Customer	: **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	: **Technical Manager,** KRIDL, Bangalore.
* Name of the work	: Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	: AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
* Sample ID	: Cement Concrete
Size of cubes	: 150mmx150mmx150mm
Cross Sectional Area	: 22500 mm^2
Technical Reference	: IS: 516-1959 (Reaffirmed 2008)
* Grade of Concrete	: M_{15}
Compressive Strength as on	: 28^{th} day
Sample Received on	: 13.04.2015

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	16.03.2015	13.04.2015	8.125	369.8	16.44
2	16.03.2015	13.04.2015	8.280	372.3	16.55
3	16.03.2015	13.04.2015	8.315	386.8	17.19

* Information is furnished by the Customer/Representative

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Job No.: CTCE/BBMP/W.No.02/KRIDL/CSR-03/780a/CUBE/2014-15 14.04.2015

TEST REPORT ON CONCRETE CUBES

* Customer	: **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	: **Technical Manager,** KRIDL, Bangalore.
* Name of the work	: Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	: AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
* Sample ID	: Cement Concrete
Size of cubes	: 150mmx150mmx150mm
Cross Sectional Area	: 22500 mm^2
Technical Reference	: IS: 516-1959 (Reaffirmed 2008)
* Grade of Concrete	: M_{15}
Compressive Strength as on	: 28^{th} day
Sample Received on	: 14.04.2015

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	17.03.2015	14.04.2015	8.135	366.6	16.29
2	17.03.2015	14.04.2015	8.290	375.8	16.70
3	17.03.2015	14.04.2015	8.325	390.2	17.34

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Job No.: CTCE/BBMP/W.No.02/KRIDL/GSB/AL/2016-17 Date : 09.03.2015

ATTERBERG LIMITS TEST FOR GSB (COARSE GRADED)

IS : 2720 (Part - 5)

Customer : **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of work : Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.

Reference : AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015

Date of Testing : 09.03.2015

As per MORTH Table : 400-11

Sl. No.	Particulars	Test Results	Standards as per Specifications
1	Liquid Limit, %	22.50	25.0% Maximum.
2	Plasticity Index, %	Non Plastic	6.0% Maximum.

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Job No.: CTCE/BBMP/W.No.02/KRIDL/WMM/Gradation/2014-15 17.03.2015

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of Work : Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.

Reference : AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015

Date of Testing : 17.03.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **29020**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	250	250	0.9	99.1	95-100
22.4	6545	6795	23.4	76.6	60-80
11.2	6310	13105	45.2	54.8	40-60
4.75	5250	18355	63.2	36.8	25-40
2.36	4550	22905	78.9	21.1	15-30
0.600	1785	24690	85.1	14.9	8-22
0.075	3350	28040	96.6	3.4	0-8

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17.03.2015

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of Work : Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.

Reference : AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015

Date of Testing : 17.03.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 29220

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	260	260	0.9	99.1	95-100
22.4	6350	6610	22.6	77.4	60-80
11.2	6185	12795	43.8	56.2	40-60
4.75	5450	18245	62.4	37.6	25-40
2.36	4525	22770	77.9	22.1	15-30
0.600	1780	24550	84.0	16.0	8-22
0.075	3390	27940	95.6	4.4	0-8

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Job No.: CTCE/BBMP/W.No.02/KRIDL/WMM/AIV/2016-17 17.03.2015

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL., Bangalore.
Name of the Work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	17.03.2015

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	303	
4.	Aggregate Impact value = percent fines	20.58	20.68	
	$100^* (W_2/W_1)\%$			20.63

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No.02/KRIDL/WMM/S-T/2016-17 17.03.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Construction of drains and improvements to roads balance main and cross roads of Susheelamma Layout and Isaq Layout in Ward No. 02 of Yelahanka Sub Division, BBMP, Bangalore.
Reference	AEE/BBMP/YSD/AE-2/2014-15 Dated: 04.03.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	17.03.2015

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.79%**

Elongation Index = **13.98%**

Result : Combined Flakiness & Elongation index 25.77%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	17.03.2015

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **12.39%**

Elongation Index = **13.85%**

Result : Combined Flakiness & Elongation index **26.24%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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